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THE TECHNIC.

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NOTICE TO SUBSCRIBERS.

Hereafter we shall follow the general rule regarding subscriptions, and shall continue sending THE TECHNIC to subscribers until notified to discontinue.

THE Junior Class distributed, on Commencement Day, the announcements of the forthcoming *Modulus*, which will appear May 1st, 1900. This will be the Century Number of the *Modulus* and promises to be one of the most attractive volumes ever issued, so far as can be judged at the present early day. But we may feel justified in saying that the class of '01 will not let any opportunity pass to make the "*1901 Modulus*" equal, if not superior, in both literary and artistic qualities to the highly creditable volumes which have been issued in the past.

THE TECHNIC extends its most hearty congratulations to the Class of '01 for the interest and energy which they are showing in the early preparation of this volume and wishes them the greatest success possible.

THE annual meeting of the Board of Managers of the Rose Polytechnic Institute was held in the Directors' room of the National State Bank, Friday morning. The newly chosen representatives of the Alumni Association, Messrs. Benjamin McKeen, '85, and V. K. Hendricks, '89, who were elected at the meeting held Thursday afternoon, the first to hold office for two years and the second for one year; met with the board, their election having been ratified. The annual election of officers of the board for the next year resulted as follows:

President — Col. R. W. Thompson.
Vice President — W. C. Ball.
Treasurer — Demas Deming.
Secretary — R. G. Jenckes.

The various committees for the ensuing year were elected. Reports were received from all of the standing committees, Dr. Mees presenting a report from the heads of the various departments stating their condition and needs. From the number of students admitted to the Institute on examination already, it is evident that the Freshman class that will enter next fall will be one of the largest in several years.

ONE of the pleasantest recollections of this Commencement will be the privilege of having heard once more our honored President of the Board of Managers, Col. R. W. Thompson, address a few words to the graduating class. Col. Thompson, on Friday, June the 9th, celebrated the 90th anniversary of his birthday. His increasing age and feeble condition makes it necessary for him to husband his strength, and his many friends, the Alumni of Rose Tech, and the students, noted his presence on Commencement day with the keenest pleasure. Each one hoping that he would be able to say a few words

although all knew that his health would not let him deliver an address. The expectations of all were more than realized, for in his clear, musical voice he spoke a few words to the class who were about to leave the Institute. Every word that fell from his lips, as he gave the graduating class the advice of a father and of one who has known the world, sank deep into the hearts of all. His eloquence and beautiful flow of words held the closest attention of the audience.

This address will long be remembered, and the kind words of advice which he gave will not soon be forgotten, as coming from one who has so long and faithfully served his country and friends in what ever capacity he could do the most good. A life devoted to the unselfish service of others he has won for himself the title of the "Grand Old Man," not only here at home, but wherever he has gone his brilliant mind has left a deep impression and has won the admiration and esteem of all. Deeply interested in the young men of his State and City, he has served for years as the President of the Board of Managers of the Rose Polytechnic Institute, and his interest in the school and those who attended its session has won a place in the hearts of students and alumni that will never fade.

THE TECHNIC joins with the Faculty, student, alumni and many friends in extending their congratulations upon this occasion, his 90th birthday, and wishing that he may enjoy many other.

IN reviewing the history which the Institute has made for itself in the last year, many gratifying features present themselves. The remarkable standing which the Alumni are taking in the engineering professions speaks highly for the thoroughness of the training of the men before they leave the Institute, and still more for the ability which they show in meeting the demands made upon them as they are forced to enter into new and difficult fields of work.

The high standing which the undergraduates have maintained during the year promises as bright a future for the young Alumni of the next few years as in the past. Not alone in the class work has a deep interest been manifest, but in the management of the students' affairs has more thoughtful attention been paid. The formation of the Council and the endowing with power to look after the affairs of the Student Body, was at first considered a step of rather doubtful nature. But after a trial of three months the students have shown that they are not only willing but also thoroughly capable of looking after many of the questions which so often annoy the faculty, in regard to the personal conduct of the students. That this movement has met with the hearty endorsement of the Faculty and the Board of Managers, we quote the following from Mr. Ball's able address to the graduating class:

"During your connection with the Institute a notable advance has been made in the methods of management. Larger liberty of action in attendance on recitations and a greater participation in the management of the Institute itself, in so far as it relates to personal conduct and control of the various organizations and activities of institute life have been accorded to the student body than in any other institution of learning with which I am acquainted, or that would have been practicable or possible a few years ago. The result has been gratifying in every way. It has resulted in better work and better order and demonstrated that self-government is not only the best but the only real government. A part of the credit for the inception and success of these changes of methods belongs to you, and here and now, voicing this the sentiments of the Board of Managers and Faculty, I thank you for it."

It is indeed a source of pleasure to know that the Faculty and Board of Managers endorse the Council and have been so ready to co-operate with them in every way to promote the efforts which the Council has put forth. This year the Council has been more of an experiment than an established and recognized organization. But with the beginning of the new year the Council will assume its duties with the full support of the

student body and the hearty co-operation of the Faculty.

Its influence has already been felt and the benefits are being reaped in several of the organizations. The Athletic Association has been lifted from the rut into which it had run, and with the new constitution and by-laws, is in a fair condition to again hold the place in the life of the Institute that it once did. THE TECHNIC has also been financially assisted, and we hope that the recognition by the Council will inspire the students to take a deeper interest in the journal which represents the life and work of the Institute to the outside world, as none of the other organizations can.

THE following letter presents several suggestions that the Athletic Associations of our State would do well to consider. A thorough revision of athletics is needed. There are too many weak points both in the college associations and in the Inter-Collegiate Athletic Association. The absolute failure of the last meet, in so far as it represented the athletics of the State, should be a warning that there is something decidedly wrong in the organization.

Let us suggest that early in the fall, before the foot ball season opens, a meeting of the I. I. A. A. be called, and that each college appoint a representative who can and will represent the interests of the individual colleges. Let a new constitution be provided and by-laws drawn up that will make it necessary for every college, in order to remain in the Association, to conform to its laws. Let officers be elected who have the courage and determination to see that the rules are enforced.

Editor Technic:

The article in the May TECHNIC on "Professionals in Athletics," is most excellent and timely and meets my cordial endorsement. Our Assosociation did right in refusing to enter the state meet. If college athletics are to serve their purpose, every vestage of professionalism must be eliminated. Even the hired coacher might well be dispensed with.

The cleansing of student athletics is not difficult if the students and teachers will only unite in a determined effort to accomplish the much-desired end. I would suggest the following plan, which might be amplified to cover the ground:

1. Debar every student against whom there is the slightest evidence of his having entered school for the purpose of playing.

2. Where a student changes from one college to another, debar him from playing for one year.

3. Debar every student who does not carry *full* work in college and whose grades are not up to a given standard.

4. Let there be a committee on athletics from the college faculty with advisory and veto powers. Let it be the duty of this committee to issue *athletic* permits to such students only as meet the above conditions. Make inability to show such permit sufficient evidence to debar the player.

Regarding professionalism in Indiana colleges, I am told by students of two prominent colleges that in their schools subscriptions have been collected to HIRE players during the last two seasons. No open charge of professionalism has been made against these schools so far as I know.

If the teachers in our colleges would make it a point to attend the inter-collegiate games, it would do much to inspire the men to better and cleaner work.

ALBERT A. FAUROT.

REVIEWS.

Physical Problems and Their Solutions; by A. Bourgougnan, formerly assistant at Bellevue Hospital Medical College. Van Nostrand Science Series, No. 113. D. Van Nostrand Co., 23 Murray and 27 Warren Streets, New York

THE purpose of the book seems to be to enable teachers, applicants for admission to medical colleges and others, to coach up for examination upon the fundamental and elementary physical problems which are likely to be met with in a general examination.

The book is made up entirely of a series of problems, completely solved, covering almost the

whole range of elementary physics. Only special cases are given, the fundamental laws and general equations being almost completely overlooked. The book is evidently intended for the use of those who desire a hastily acquired knowledge and has little value for the technical student or engineer.

A Primer of the Calculus, by E. Sherman Gould; D. Van Nostrand Company.

IT is unfortunate that a supposedly modern primer of the calculus, written by a civil engineer of prominence, should embody obsolete mathematical explanations of the subject, such as always gather about a science in its early stages of development. It is rather strange to see such ideas as that a differential is "a quantity smaller than any quantity that can be expressed in figures," "a mathematical figment," "the indivisable atom of a straight line," etc., clinging tenaceously to the so-called practical professions. It may be stated at once that such ideas have no place in an exact mathematical science, and that whatever the author says about their usefulness and necessity in the subject has no foundation in fact. If the student does not allow his credulity to get the better of his common sense, he may obtain from the book a fair empirical knowledge of the elementary methods of the calculus, but he may, nevertheless, be quite uncertain as to what use can be made of such knowledge outside of the illustrations and examples of the author.

Petroleum Motor-Cars, by Louis Lockert, D. Van Nostrand Company, N. Y., 1898. 218 pp., XX chapters, 92 illustrations.

THIS work is more a general treatise from the historical standpoint than a strictly technical discussion of the motor-cars that have been produced, but will be of interest to those who are only seeking a general knowledge of the horseless carriage. The book is well illustrated, but of a very inferior quality, so much so that in many cases the illustrations are scarcely intelligible. They are of a general nature, showing the appearance and arrangement, but giving little of the details of construction.

The author very frankly states in the first chapter that of the auto-motor-cars now upon the market there is not an entirely satisfactory motor and that a great advancement must be made before horseless carriages can become a commercial success—and that only a few years will pass until the motors of to-day have been replaced by a radical improvement in design and construction.

Various forms of combustion motors are discussed in the first chapters. The fuel question is given considerable prominence, and of the hydrocarbons, petroleum seems to be by far the most useful and convenient fuel.

The history of petroleum motors is traced from the first petroleum car—the Ravel—patented in 1868, to the cars of the present day, in both this country and abroad. The whole book is more or less a treatise of the work that has been done in France, with only an occasional mention of other countries.

Chapter XVII. is devoted to the "American Petroleum Cars," the Duryea car being one of the most prominent and successful of the early American auto-motor-cars.

Chapter XVIII. is devoted to the discussion of "Accessories: Lubricators, Brakes, Pneumatics."

Chapter XIX. and XX. "Acetylene—Moessan and Willson, "Acetylene as a Motor; Liquid or Gaseous." Acetylene is rapidly coming into prominence, and, as the author says, "it is a very powerful and at the same time a very portable storer of energy." When the properties and methods of handling are better known there is no doubt that acetylene will rapidly come to the front.

The book is of particular value to those who desire a history of the efforts that have been made to produce a successful auto-motor-car, the author having very plainly pointed out many of the defects in the systems that have been attempted, and has added a number of valuable suggestions.

The Engineer in the Navy.*

By PROFESSOR MORTIMER E. COOLEY,

Professor of Mechanical Engineering, University of Michigan, Ann Arbor, Mich.

ABSTRACT OF ADDRESS DELIVERED AT COMMENCEMENT.

I HAVE experienced much the same anxiety which Mr. Johonnott confessed to me just now, in addressing this audience composed of his old friends, associates and professors. I also have some hesitation in speaking before this assembly and before Colonel Richard W. Thompson. For as a cadet at Annapolis I knew Col. Thompson when he was Secretary of the Navy, and he presented me with my diploma upon graduating from the Academy. Seeing my embarrassment, he said, "Well, my boy, here is your diploma; take it. If ever you get in trouble, come and see your father."

So much has been written in the last year concerning the United States Navy and the personnel, since the beginning of the trouble with Spain, that I will not touch upon many of the more familiar subjects upon which you are already so well posted. But there are some points which are not so well known, and it is of these that I desire to speak. Poets have sung of battles, of deeds of valor, hand to hand conflicts, heroic deed upon the bloody deck, until the heroes have become immortalized in song. But of the men beneath deck, in darkness and below the rolling waves, deep down in the hold of the vessel, shut up in a heated iron tank, hammered at by missels which now and then let the day light in and splinters fly, from whence they know not, nor where or who the enemy is, beyond the sight of the vigilant eyes that have recorded the deeds of valor—to these belong an equal, if not greater, share of the honor.

If it were not for these brave men, shut in below deck, deep down in the hold of the vessel, where only the pounding of the enemies' shot and the roar of the battle raging above, and the ceaseless throbbing of the machinery, tell them of what is going on, the battles of the present and the future could not be fought and won. They dare not stop to ask questions, they know not where the vessel is heading; only the orders which come from the bridge above tell them that the vessel is still in the hands of friends. Here with the delicate and intricate machinery which requires unceasing supervision they toil in the heat, keeping the splinters which fly from the battered sides out of the machinery, mending a broken part, patching a leaking joint, scalded by escaping steam, dripping with sweat and reaking with oil—these are the men, the engineering corps, who are not counted as combatants.

They control the machinery that gives the vessel her life and power, the mechanism that operates the revolving turrets that move and elevate the great guns, that hoist the ammunition, that supply the great search lights with power, that do the thousand and one little things that make it possible for the line corps to perform their duties and to win honor and fame upon the upper deck while those below pass unnoticed.

But the engineer is as truly a combatant as any of the line officers who stand upon the bridge and give orders to those below, and those behind the guns, for the modern vessel is a machine, a fighting machine, and her power and life depends

*THE TECHNIC is indebted to the *Gazette* for this report.

upon the engineers. They are indeed more important to the life of the vessel than the men who protect her and scatter destruction.

To whom the honors of a successful engagement belongs has long been a disputed point, and one which has caused so much ill feeling and jealousy among the line and engineering corps.

Each man feels that he is responsible in a great degree for the success of the engagement and knows that without his part being successfully performed the battle could never have been won. Yet each has refused to participate in the work of the other, it being considered beneath the notice of the line officer to engage in the duties of the engineering corps. Trouble has thus often been caused in an emergency by the refusal of the one to lend a helping hand to the other. Enlightened opinion has long favored the abolishment of the distinction between the line and engineers. Engineer officers should be line officers and all line officers should be taught engineering.

What is known as the "Navy Personnel Bill" has lately been passed by the Senate with practically no opposition, and will in all probability do away with this difficulty. It eliminates all controversy between the line and engineers by practically making the engineer indistinguishable from the line officer. In other words, the line officer may choose engineering duties and at the same time still be a line officer with all the rights, rank and standing of the other officers of the line.

This has in a great measure quieted the feeling that has existed and will no doubt solve this difficult question as soon as it has been given a fair trial.

Let us briefly consider the development of the navy which has brought about this state of affairs and has made it necessary to create two distinct corps—the line and engineers.

In the old navy all of the officers were of the line, but with the advent of the steam engine a rapid change was made, and it became necessary to create a special class of officers known as the engineering corps.

To the inventive genius of Robert Fulton we owe the first application of steam as a motive power for vessels, and to his inventive genius, energy and industry the world is indebted for the first successful application of steam in navigation. When the steam engine was first introduced in naval vessels there was probably little thought given that it would ever become more than a secondary motive power. The original and sole idea of the introduction was to enable vessels to leave harbor against wind and tide and to prevent them being becalmed, the sails being depended upon entirely for propelling the vessel. There were good reasons for this in that the early steam power required such excessively heavy machinery and such large quantities of fuel that it was not possible to carry enough for a long voyage. As early as 1812, while the war with England was still raging, Fulton conceived the idea of constructing a steam propelled war vessel, a floating battery, for which he drew the plans, and intended it to be propelled by steam alone against wind and tide.

Fulton had this vessel started under his own direction, but before it was completed he died. However, after his death, in 1815, the vessel was finished. The venture was in a measure successful and the first steam war vessel created quite a favorable impression, as it steamed about the harbor. "The Fulton," as it was called, was a side wheeler, 156 feet in length, 36 feet beam, 26 feet deep and 125 tons burden. This was the first steam war vessel in the world, and to Fulton belongs the honor.

A second war vessel was soon after constructed, a tug named the "Sea Gull," which was used in the West Indies in the suppression of piracy. This, with the "Fulton," were the only two war vessels propelled by steam that had been constructed up to the end of 1836.

A board was appointed at this time under Captain Rogers, afterward Admiral Rogers, to investigate the feasibility of using steam as a motive power in the navy. The board reported absolute ignorance of all the officers of the navy of the laws of steam, not even Marriotte's law being known. This state of affairs threw quite a

damper upon the introduction of steam into the navy, but engineers were advertised for and after a time a few were found. The first engineer of the navy was Charles H. Haswell, who is now living in New York at the age of 96. To him belongs the credit and honor as much as to any one else for the introduction of steam as a motive power and the instruction of the naval officers in the first principles of steam engineering. There was associated with him one, B. F. Isherwood, who has done more than any other two men in the country in the development of the marine engine and steam engineering. Mr. Isherwood has been to America what Prof. Rankine was to England.

The first iron war vessel to be built and equipped with steam was designed and constructed by Mr. Isherwood in 1842, and was called "The Michigan." Mr. Isherwood had "The Michigan" built in Pittsburg and shipped in sections to Erie, Pa., where it was assembled and floated. For over fifty years it has been in service with few repairs, the old iron plates of the hull being still intact; the side wheels have been replaced, but the original side beam, wooden framed engine still creaks and groans as it did fifty years ago.

The study of the operation of "The Michigan" has done more for steam navigation than that of any other vessel afloat. Isherwood's name will always be written with golden letters upon the history of marine and steam engineering for the invaluable service rendered to the world in establishing steam engineering upon so firm a foundation.

History shows that war periods are productive of the greatest inventive skill and that many of the greatest revolutions in existing methods have been brought about by the demands made by war.

To Watt, about the time of the Revolution, we owe the first conception of steam as a motive power and the steam engine. To Fulton, during the war of 1812, we owe the design and construction of the first war vessel propelled by steam. During the Civil war we find a still greater development under the renowned engineers, Commodore Isherwood, C. H. Coopland, Superintendent of the West Point Foundry and John Ericsson. The two most celebrated vessels of this period were the Monitor and Merrimac, which were the production of the genius of Ericsson and Isherwood.

The close of the Civil war witnessed a revolution in the navy which has only been equalled in the last ten years, when the epoch known as the New Navy began.

However, it was not until 1874 that steel was introduced into the construction of boilers which had heretofore been constructed of iron and the pressure was necessarily limited to about 40 lbs. But with the introduction of the compound engine higher pressures were required and greater boiler efficiency. From the introduction of higher pressure in the boilers and greater efficiency in the engine began the era of the New Navy.

It is unnecessary to trace the history further, for in the last few years the development has been phenominal, and to-day our magnificent navy stands third in the navies of the world.

I would like now to speak of the development of the officers and the demands that are made upon them.

One lesson which this late war has thoroughly taught is the great importance of the training in engineering operations of the officers. The Americans are a nation of men with a most remarkable mechanical aptitude, and I attribute a large part of the success of our conflict with Spain to the wonderful ability of our men to make the quickest and best use of their mechanical skill. This mechanical skill is just as important to the care and manipulation of the large guns and turrets as for the control of the motive power, and for this reason the mechanical aptitude of the Americans played such an important part in the late victory.

The United States Navy is destined to a great expansion that will demand for its greatest efficiency a highly trained personnel.

The "Personnel Bill" has made all of the officers, both those concerned with the management of the guns and the men and those who

control the motive power, engineers as well as officers of the line. This is the first step in the reorganization of the navy and the next step will no doubt soon follow in creating a naval reserve and requiring all seamen to be mechanics as well as sailors. In the last year the service rendered by the volunteer army is beyond expression. Men from civil life stepped directly into the ranks and won distinction where ever they were sent. The uneducated and undisciplined men filled the ranks with credit and honor. But in the navy this is not possible, every man cannot step in and become a sailor in a day. Men from the interior of the country who have never been on the sea cannot become seamen as easily as they can fill the rank and file of the army.

When the war broke out there was a decided lack of well-trained men to fill the positions of officers that had to be created. The older men who had retired from active service were pressed into service, and along with them came many of the younger generation, graduates of our engineering schools, who filled successfully the positions in the engineering corps and rendered excellent service, which testifies to the thoroughness and completeness of the training which is given in our schools of engineering.

A favorite idea of mine is that our schools of engineering should teach Marine Engineering and Architecture, not because the student will perhaps ever be called upon to make direct use of the knowledge, but the knowledge and experience that will be given and the intimate acquaintance with the needs and requirements of the navy will do much to develop the inventive genius and to turn the attention of the engineering fraternity to the development of our marine service.

Our country is almost wholly dependent on the civilians in case of war to defend and protect her interests. Our army and navy is small; men for the army are easily obtained, but it becomes another problem to supply the navy. The life on the sea is not what it is considered, the hardships are greater and the opportunities are less.

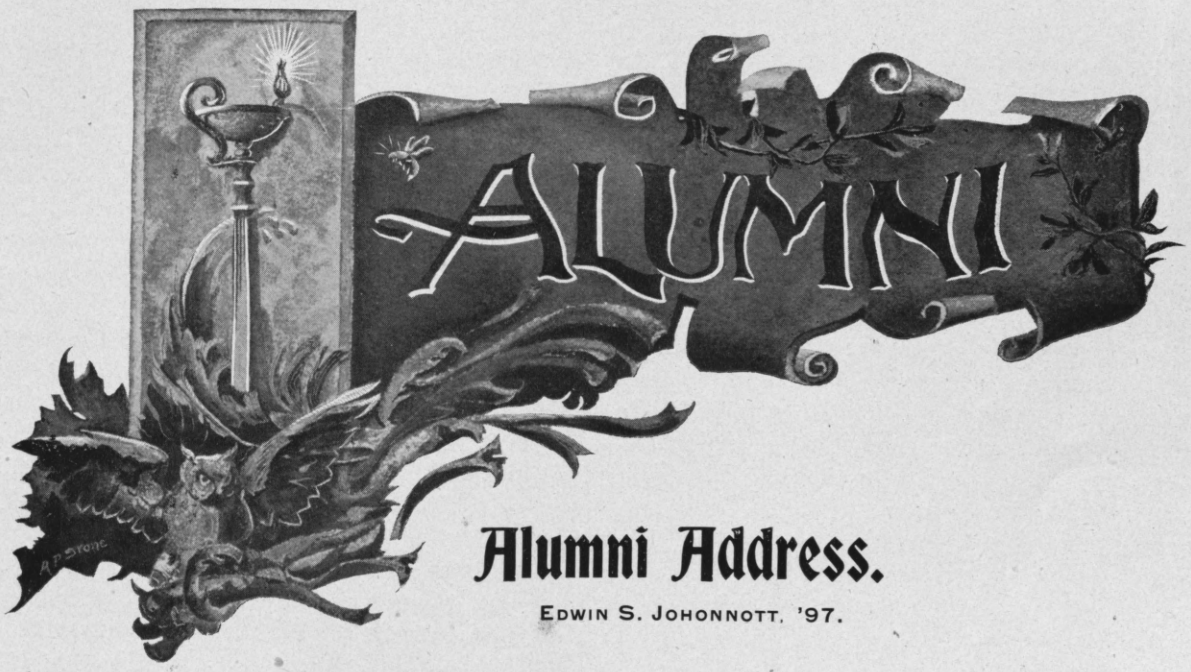
This country is just in the midst of a great revolution in her existing methods of conducting the army and navy and perhaps the next few years will witness a greater change than the last, as a result of this war, in the developing of a great volunteer naval reserve, who will be trained and ready to step in and fill the rank and file in case of a call for men.

The man who has perhaps done more in the last few years, in developing and bringing to the front the American Navy and especially since the conception of the New Navy, is Engineer-in-Chief Melville. To his untiring and indefatigable energy is due the rapid development and construction of our modern war vessels. What he has accomplished has influenced the whole world and a revolution has been wrought in methods of construction.

To the engineer of the navy belongs many a victory which could not have been without the skillful management of the vessel by those who live below the deck.

The remarkable performance of the "Oregon" in the trip around the continent from San Francisco to Key West is an engineering feat that has been recognized the world over as unparalleled. Not a break or an accident occurred, due to the skill and close supervision of the engineering force, and when the "Oregon" entered Key West there was not a requisition for repairs filed.

To-day the engineers of the United States Navy who have been retired from active service are sought after all over the country as men of wide and varied experience, who are pre-eminently fitted to become the heads of great industrial establishments. They have become a power and a factor in the world which reflects the greatest credit upon the engineering profession.



Alumni Address.

EDWIN S. JOHONNOTT, '97.

"BY Technical Education in the broad sense of the term is meant the instruction in the principles of those sciences which bear directly on the industries."

While those engaged directly in the trades and industries derive the greatest benefits from technical education, it is also true that it is becoming to be considered an important element in the training of the students in many fields of science.

One of the strongest indications of this is the view taken by the eminent mathematician, Professor Klein. Klein's idea is to bring together theory and practice. Not alone to teach the engineer how to make the most comprehensive use of the results of science, but as well to direct the work of the scientists in those channels most useful to the engineer. He thinks that among the advantages to be gained by the scientist is a clearer interpretation of the results of his work and in gaining a higher idea of practical work the old spirit that an education may be gained only through the old languages, will be broken. On the other hand, the most refined scientific methods will be brought to the solution of technical problems. This will come about not only directly through the higher training of the engineer, but also through affording the scientist an opportunity to become interested in the problems which are before the engineer.

He proposed to establish a physico-technical institute in connection with the university for the higher education of those engineering students who have the opportunity for further study. The completion of the course was to be the presentation of a scientific thesis on some technical subject for a university degree. The name physico-technical was suggested by the close relationship between physics and engineering, the one dealing with the forces of nature on the smallest scale; the other on the largest. These plans were proposed by Klein in 1894. Since then his ideas have been realized to a certain extent in some of the German universities. It is, however, only within a few weeks that the grandest co-operation between the scientist and engineer has taken place in England in the organization of a National Physical Laboratory. It may be remarked that of the thirty-six ordinary members constituting its general board, twelve are to be chosen by the institutions of engineering.

One of the chief causes of the revolutions

which have taken place in the method of instruction in the sciences and the practice of engineering in the last few centuries has no doubt been brought about by the mutual assistance they have afforded each other. This is in no place better illustrated than in the study of electricity and electrical engineering. In some instances it is difficult to draw the boundary line between the subject or to distinguish the physicist and engineer, even in the same individual.

We are gradually getting free from tradition with respect to the methods of instruction in the Physical Sciences in very much the same manner as we are getting free from the excessive classical requirements for scientific students. For instance, there is a continued tendency in recent years to lessen the cramming of facts and formulae into the head of the student, to be forgotten at the last examination, but rather to train him to think logically and clearly the relation of principles. Too much drill in these directions can scarcely be had. For the classics as a mere training in mental gymnastics it would seem advisable in the case of the student in the sciences to substitute some of the sciences which are equal, if not superior, as a means of mental discipline, while at the same time useful both in teaching us how to present our own ideas as well as to interpret those of others.

Germany has made the greatest progress in these directions and nowhere has modern industry made greater progress or technical education reached a higher development. England, however, has been quick to see the advantages of the German system, and is rapidly adopting reforms in her own. In fact, the statement was recently made that at Cambridge, the hot-bed of the examination system, a student could now enter the university and complete his work for a degree without taking a single examination.

Nevertheless, it should not be forgotten that the leaders in physical science, particularly those like Newton, Kelvin, Helmholtz and Maxwell, who have laid the foundation principles of modern physics, have usually been and will no doubt continue to be men of the highest mental training, particularly in the classics. For such as these a practical training might be as unprofitable as excessive classical work for the other student in experimental science.

We come now to the student who receives a peculiarly high benefit from a thorough practical training, the student in experimental physics. The success of the research student depends on his practical and manipulative skill to a degree that is seldom ever estimated. One of the most pitiable objects in the laboratory is the student who has good theoretical training, but who is unable to see and appreciate the mechanical difficulties which make his ideas impracticable. He may be well grounded in mathematics and his scientific training all that is to be desired. This defect in the preparatory work of the graduate student in physics is being remedied in many of the leading institutions by thorough and systematic courses in physical manipulation. This, however, would to a certain extent seem to be deplorable; for how much more effective is instruction of this character with the young student.

The laws of physical science are discovered and developed in two ways; either the theory comes first and is followed by its experimental verification, or the observation by experiment precedes the theory. Maxwell's work, followed by its verification in that of Hertz's, and Faraday's followed by its theoretical treatment in Maxwell's are beautiful examples of both methods. The more natural process, however, for the discovery of new principles, is first, through their observation by experiments. These are more trustworthy for future development and more likely to be fruitful in the applied sciences. And this, as Klein says, is the highest object of all work in the sciences.

It is, however, generally conceded that the study of the pure science has an essential value quite distinct from any practical application. First, as a means of mental development and acquirement of knowledge, and second, in the possibility of leading indirectly to truths of high practical use. We have seen how Faraday's re-

searches, begun in a pure spirit of inquiry, have led to such wonderful applications of electricity and magnetism. Another illustration is in the fact that the ancient Greeks were thoroughly familiar with the properties of the conic sections. It is, however, only within the last few centuries that these properties have reached their high practical application. It would thus seem unsafe, even from a practical point of view, to limit the lines of investigation of the scientists to only those which promised immediate practical use.

It is probably impossible to fully estimate the influence which research has exerted on modern civilization, in extending the boundary of our knowledge in the pure sciences and in its effects on inventions and the industries.

The student in experimental science may work with two objects in view. First, to increase his knowledge, and second, to gain power to make practical application of his knowledge to the solution of practical problems.

He begins research work as soon as he develops a spirit of inquiry and attempts to interpret and explain the results of his observations. Work of this character has the highest value, for it develops originality and independence. In fact, research work is becoming to be considered as an important factor in the education of the engineer. S. P. Thompson says that "good training in methods or research work are absolutely necessary for the practical chemist." There is no reason to doubt but that the same remark applies to the engineer, who may be considered as a practical physicist and mathematician.

According to the statement of an English magazine, great advances have been made in the last three or four years in England toward higher technical education. It says that "in the Polytechnics new and well equipped laboratories have been provided, and facilities afforded to students to pursue this work, without a break, from the lowest branches up to the highest, and to undertake in conjunction with his teachers original investigation and research. A considerable addition has been made to the instruction of a distinctly university rank. And it is estimated that in the London Polytechnics there are over one hundred students definitely studying for university degrees in science. This constitutes no small proportion of the total of matriculated students for science degrees.

This would seem to be a step in the right direction to give the engineer a good grounding in the sciences, as well as the power to make high application of scientific principle.

The engineer, however, claims that the conditions under which he must work are different from those of the scientist and require different methods. For instance, the physicist tries to attain the highest degree of accuracy through isolating as much as possible the quantity which he wishes to measure, and carefully calculating the effects of those which must necessarily come in. He expects his work to stand the test of future repetition, the results to establish a definite fact.

The engineer, however, is satisfied with a sufficient degree of accuracy, which is usually in the second or third place of decimals, instead of the sixth, where an eminent physicist has said are in the future to be found the truths of physical science.

The reason why the engineer does not strive for the highest degree of accuracy, is that the conditions under which he must work are seldom the same for the determination of a quantity. It would be useless, for example, for the engineer to measure the modulus of elasticity of a specimen of steel to the same degree of accuracy that the physicists would the index of refraction of pure water. For we know that the elasticities of different specimens of steel are different. Similarly it would be impossible for the engineer to measure the horsepower per hundred pounds of coal for any engine and predict from that what it would be for another of a different type.

Perhaps the subject on which the least discussion has been made is the benefits which experience in the applied sciences has for the student in pure science. Hertz' work is a very worthy exemplification of the high character of these

benefits. Until he was twenty-one years of age his intentions were to become a civil engineer. The student beginning work in the laboratory soon learns that reading the description of an experiment is quite another thing from repeating it in the laboratory. He is at first confused by what he sees, but soon learns that everything may be explained by a few simple principles.

When, however, he finds that his results do not correspond to those of previous observers, he has either made a blunder or is on the road to a discovery. And here is where the study of the sciences has one of its greatest advantages. The student is able to compare his results with a standard that is invariable and absolutely independent of the prejudice of any person.

Further discussion of the relative merits of the classes and the sciences of the preparatory work of the scientific student would be out of place here.

It might, however, not be out of place to quote what President Schurman, of Cornell University, has to say about the engineering profession from an educational point of view. He says: "I simply wish to raise the question whether taking the country as a whole these professions which many anachronistic seats of learning still fail to recognize, are not, in virtue of the solid and prolonged training which their members receive in the technological schools, better entitled to the designation 'learned' than in their present status, the venerable trinity, law, medicine and theology."

It is customary on this occasion for an alumnus to give the members of the graduating class the benefits of his experience in the form of advice. I have but a word to say. It is rarely the case that the student can plan his course and follow it vigorously after graduating. With many of us much depends on circumstances and the opportunities that open.

It is no doubt true, as I heard an instructor in the Institute remark, that the chance for success in all the lines that are open to us are about evenly divided, even with respect to the remuneration.

Nevertheless, there is in general a particular calling for which we are peculiarly fitted. When we are assured of this we should make every effort to fit ourselves for that calling; again, we should not depend too much on our own judgment in the choice, for our teachers know us better than we know ourselves, and from their broader experiences are better able to judge of our chances for success.

ALUMNI NOTES.

James Farrington, '96, has been promoted to take the place left vacant by Shover, '90, of Assistant Electrician, Ohio Steel Co., Youngstown, Ohio.

Shelby S. Roberts, '98, has accepted a position as leveler with the engineering corps of the L. & N. Railroad and will have headquarters in Nashville. He is in the same corps as Arn, '97.

James Dale, '93, who has had the position of secretary and general manager Peerless Amalgam Co., Denver, has accepted a position with the Hallwood Cash Register Co., Minneapolis, Minn.

Frank N. Hibbett, '87, formerly trainmaster of the New York Division of the Erie Railroad, Rochester, N. Y., has been promoted and made Superintendent of the Jefferson Division of the Erie Railroad, Elmira, N. Y.

Barton R. Shover, '90, has been promoted from Assistant Electrician of the Ohio Steel Company, Youngstown, Ohio, to Electrical Engineer and Superintendent of the Electrical Department, taking Wales' place.

Mr. Theodore D. Jones, '89, formerly resident engineer of the Canton City and Cripple Creek Electric Railway Company, of Canton City, Col., has been given a position in the office of the chief engineer of the Union Pacific, Omaha, Neb.

Samuel S. Wales, '91, who has held the position of Electrical Engineer and Superintendent of Electrical Department of the Ohio Steel Co., Youngstown, Ohio, has accepted a similar position as Superintendent of the Electrical Department of the Carnegie Works, Homestead, Penn.

Official Report of the Thirteenth Annual Business Session of the Rose Polytechnic Alumni Association.*

THE TERRE HAUTE,
3 p. m. Thursday, June 15th; 1899.

The thirteenth annual business session of the Rose Polytechnic Alumni Association was held at 3 p. m. Thursday, June 15th, in the ordinary at The Terre Haute.

The meeting was called to order by John B. Peddle, '88, President. Before the regular order of business was taken up, the Election Committee announced their readiness to accept the votes for Alumni Representatives on the Board of Managers of those who had not already voted by letter ballot. The result was the election of Ben McKeen, '85, for the two year term and V. K. Hendricks, '89, for the one year term.

The roll call showed the following men present:

Class of '85—Benjamin McKeen.

Class of '86—Charles E. Scott, Harry G. Brownell, Herbert W. Foltz.

Class of '87—J. B. Aikman.

Class of '88—John B. Peddle, George M. Davis.

Class of '89—A. J. Hammond.

Class of '91—R. L. McCormick.

Class of '93—E. S. Johonnott.

Class of '94—F. F. Hildreth.

Class of '95—W. D. Wiggins, W. O. Mundy.

Class of '96—W. J. Klinger, O. E. McMeans.

Class of '97—David Ingle, Jr., W. G. Arn, T. Guy Pierson, Arch G. Shaver.

Class of '99—Jas. J. McLellan, E. P. Edwards, F. H. Froehlich, Geo. H. Likert, C. B. Keyes, J. F. Schwed, Harry C. Schwable, A. C. Thompson, J. E. Holliger, C. F. Trumbo, C. A. Howell, J. Milton Platts, W. G. Davis, N. P. Burt, A. P. Stone, W. D. Crebs, N. C. Butler, Jr.

The regular order of business followed this announcement. It consisted of reading of the minutes of last annual meeting and Treasurer's annual report by J. B. Aikman, '87, Secretary and Treasurer, reports of committees, etc.

REPORT OF TREASURER.

ALUMNI FUND.

Receipts in 1898.

Balance on hand as per last report	$41 25	
Annual dues paid last meeting after report was submitted	40 00	
		$ 81 25

Disbursements in 1898.

Clerical work done for Secretary	$ 5 00	
Postage for Executive Committee	5 46	
Postage for Secretary	3 44	
Revenue stamps for Secretary	10	
C. W. Brown, printing envelopes and circulars for Secretary	3 50	
C E Hollenbeck, printing menu cards	5 50	
Moore & Langen, printing invitations and postal cards	10 00	
114 copies "Technic" containing report of 1898 meeting, mailed to Alumni members	10 00	
Balance at close 1898	38 25	
		81 25

Receipts in 1899.

Balance from 1898	$38 25	
Annual dues for 1899 received to date	39 00	
Balance on hand to this date		77 25

BANQUET FUND, 1899.

Receipts.

From members present	$126 00	
		$126 00

Disbursements.

Chas. Baur, banquet, including cigars, piano, etc.	$115 00	
Balance	11 00	
		$126 00

Respectfully submitted,

June 15, 1899

J. B. AIKMAN,
Secretary and Treasurer.

Resolutions were adopted as follows: (*a*) That the secretary appoint corresponding secretaries in each class of the Alumni, whose duty it shall be to establish what is called "Class News Letters." According to this plan the corresponding secretary mails postal cards once a year to each member of his class requesting in response a newsy letter concerning himself, stating where he is, what he is doing and everything that would be of interest to his classmates. All these replies are collected, copied in one collection and the whole mailed to each class member. In this collection the Alumni Secretary is to in-

*THE TECHNIC is indebted to the *Gazette* for this report.

corporate any communication that will promote the interest of each Alumnus in his Alma Mater and tend to cement the relations between the Institute and its graduates, as well as between the graduates themselves.

(*b*) That the editors of ROSE TECHNIC be requested to publish in full the Alumni address delivered at this commencement by E. S. Johonnott, '93.

(*c*) That the ROSE TECHNIC is hereby declared to be the official organ of the Alumni Association.

(*d*) That the treasurer is authorized to purchase extra copies of THE TECNNIC containing the report of this meeting sufficient to mail to all Alumni who are not subscribers to that journal.

Considerable informal discussion took place along the line of what may be done in different directions by the members of the Alumni for the spread of information in all parts of the country, concerning the superior merits of the Rose Tech, and of other plans whereby the graduates may promote the welfare of the Institute.

By special resolution unanimously adopted Prof. Cooley was invited to be the guest of the Association at the banquet.

Election of officers for the ensuing year resulted as follows:

R. L. McCormick, '91, President.

F. F. Hildreth, '94, Vice-President.

John B. Aikman, '87, Secretary and Treasurer.

Executive Committee—H. W. Foltz, '86, (Chairman), V. K. Hendricks, '89, John B. Peddle, '88.

After voting into membership of the Association the class of 1899, the meeting adjourned.

R. P. I. ALUMNI BANQUET.

The banquet took place at 9 o'clock Thursday in the café of "The Terre Haute." About fifty were seated around the long and beautifully decorated table, all being arranged according to classes.

Mr. John B. Peddle, '88, president and toastmaster, occupied the position at the head of the table. On his left sat those members of the R. P. I. Faculty in attendance. On his right sat the Secretary of the Association, J. B. Aikman, '87, and members of the Board of Managers. The remaining seats were occupied by members of the Alumni.

The scene presented by this body of young men, arrayed in the conventional dress suits, their lapels adorned with pink carnations (one having been found at each place), was indeed attractive. The table was handsomely decorated with fern leaves, while potted plants adorned the corners of the room where an expert harpist was concealed.

The following menu was then faultlessly served:

Bouillon in Cup. Chablis
Boiled Salmon, Sauce Hollandaise.
Dressed Cucumbers.
Sweetbreads—Pique. Sauterne.
New Peas. Sauce Periguex.
Violet Punch. Cigarettes.
Spring Chicken en Casserole.
Water Cress Salad.
Strawberries and Ice Cream.
Assorted Cake.
Coffee. Cigars.

After justice had been thoroughly done to this, and the cigars had been passed, the program of toasts was opened by the toastmaster, Mr. John B. Peddle. These lines which appeared on the program formed the suggestions according to which he was expected to speak:

"There are five reasons why men drink—
Good wine, a friend, because I'm dry,
Or lest I should be bye and bye,
Or any other reason why."

He said in part:

"When I saw this verse I at once thought that I could add a sixth very cogent reason to the five just given, for I felt sure that I should be driven to drink from shear dispair at my total inability to discuss the subject in any adequate manner. In the matter of drinking, modesty forbids that I should claim to be anything more than an amateur, and I think that this should have been considered when the topic was assigned me. If Mr. Foltz, whom I strongly sus-

pect is responsible for this selection, had only taken it for himself, I am sure that it would have been treated in a thorough and masterly fashion.

Artemus Ward used to have a lecture on "Ghosts" in which ghosts were not mentioned from start to finish. I feel so keenly my lack of preparation and experience on the subject assigned me that I think I cannot do better than imitate him in this respect by breaking away from it altogether, especially as I want to say a few words to the graduating class on a subject of my own choosing, that of making the best use of your opportunities.

You will, all, I trust, leave here with a great deal of pride in your chosen professions, and will enter upon your work with a great deal of enthusiasm and an ambition to make good places for yourselves. It will be pretty safe to depend on this to keep you hard at work for the first few years, especially as the pay you are likely to get will be a strong incentive in itself for better work. But by and by as the years pass, and you get more familiar with your duties, so that you feel no need to worry about them as you did at first, and as your salary increases so that you no longer have to practice small economies in order to live comfortably, there is apt to come a relaxation in your efforts, and this I regard as one of the most critical periods of a young man's life.

Andrew Carnegie, in speaking of his experience in managing large manufacturing concerns. once said, that in this business a company had either to progress or go under, and that there was no possibility of remaining stationary. It must either press forward adopting new methods and taking advantage of every new discovery that will increase the efficiency of production, or it must shortly be crowded to the wall by those of its competitors who do this.

I think that the same is true of the individual man. It is so easy to glide into routine ways where no thought is required that many men do it unconsciously and are surprised on waking up some morning to find their occupation gone and themselves fitted for no other work. There are few things in life more pitiful than to see an old employe turned out of a life-long position to make way for a more progressive man, and on that account, if no other, I think it is of the highest importance to preserve as far as possible that flexibility of mind which will allow you to readily adapt yourself to changed conditions, and this can only be done by keeping up an active interest in everything new going on about you.

It is a good plan to early acquire the habit of attacking and solving your own problems for yourself. The benefit from this will show in many ways. Each difficulty successfully overcome makes the next one easier, and the feeling of courage and self-reliance which it engenders when you have to face new and unforeseen conditions is of the greatest value.

There is a big difference between the man who for lack of confidence in himself or from laziness never takes the initiative but always follows the lead of some one else, and the man who agressively meets his difficulties more than half way. The former may be a good enough fellow and have many solid qualities, but he will never be more than a machine to work out some one's else ideas. * * *

Too many men lay the blame for their lack of success to a lack of opportunity, and instead of making the best use of the opportunities they have are continually whining because fortune has not favored them as it has their neighbors. If you have any true manliness you will not wait for opportunity to come to you, but will make your opportunities for yourself. The men who have left the biggest and deepest dents on the sands of time are those whose early opportunities were apparently the poorest.

So in the matter of time, it is the busy man who does the most outside of his regular work, while the man who has nothing to do can never find time for anything. You probably know something of this yourselves. During the school year you have little difficulty in finding time for special studies outside of the regular curriculum in which you are interested, but when you plan work for the long vacations do you ever do it?

Nine times out of ten you don't. In one case you appreciate the value of your time because of its scarcity and in the other when it is given you freely you waste it.

One more piece of advice and I am through. We none of us, I think, have much affection for the man who is continually blowing his own trumpet and expects us to dance to its music, but on the other hand too much modesty is apt to be as great a vice as its opposite. If you have any merit don't hide your light under a bushel with the expectation that some one is going to come prowling around your particular bushel and overturn it on the chance of finding a candle in that rather unusual hiding place. If he does the chances are that it will have gone out for lack of air. Meritorious people are sometimes discouraged accidentally but not often and therefore it behooves us all to give the world at large a reasonable intimation of our powers if we expect it to make any use of them.

In conclusion, I want to give you a warm welcome to the Association on behalf of the older members and to assure you of the interest we take in your success, and that we will do all we can to further it. On your part don't forget that you owe us reciprocal duties and that wherever you are, if you expect the Institute to be true to you, you must preserve your loyalty to the old school.

Following this, Mr. Harry G. Brownell, '96, of Louisville, responded most happily in a reminiscent view to the toast

"Looking Backward."

"Le's go a-visitin' back to Grigsby's station—
Back where the latch-string's a-hangin' from the door,
And ever' neighbor 'round the place is dear as a relation—
Back where we ust to be so happy and so pore"

W. C. Ball, representing the Board of Managers, responded to the sentiment

"Feeding as a Social Function."

"We may live without poetry, music and art;
We may live without conscience and live without heart,
We may live without friends,
We may live without books;
But civilized man cannot live without cooks."

The remainder of the program, as was most interestingly carried on, was as follows:

"Shirt Waist" . . . . . W. O. Mundy, '95.
Address—"The Institute in Relation to the Alumni" . . . . . Dr. C. L. Mees.
"Embalmed Eatables" . . . . . F. F. Hildreth, '94.
"Class of '99" . . . . . Harry C. Schwable, '99.
"The Secret of Success" . . . . . Dr. Thos. Gray.

Following are the names of those who were present at the banquet:

Wm. C. Ball, Terre Haute, Board of Managers.
W. S. Rea, Terre Haute, Board of Managers.
C. L. Mees, President R. P. I.
Thomas Gray, Faculty R. P. I.
W. A. Noyes, Faculty R. P. I.
Arthur Kendrick, Faculty R. P. I.
F. C. Wagner, Faculty R. P. I.
John B. Peddle, President A. A.
J. B. Aikman, '87, Secretary A. A.
T. L. Condron,' 90, Chicago.
E. P. Edwards, '99, Louisville, Ky.
B. F. Failey, '96, Terre Haute.
F. H. Miller, '95, Louisville.
W. D. Wiggins, '95, Pittsburg.
L. Clifford Anderson, '95, Franklin, Ohio.
W. O. Mundy, '95, Milwaukee.
David Ingle, Jr.' '97, Oakland City, Ind.
Uhel U. Carr, '96, Terre Haute.
W. G. Arn, '97, Nashville, Tenn.
T. Guy Pierson, '97, Spencer, Ind.
H. C. Westfall, '97, Mattoon, Ill.
M. B. Stewart, '98, Terre Haute.
Cecil A. Howell, '99, Schenectady, N. Y.
A. C. Thompson, '99, Ridgeway, Pa.
George H. Likert, '99, North Platte, Neb.
Arthur D. Kidder, '99, Webb City, Mo.
W. G. Davis, '99, Washington, D. C.
C. F. Trumbo, '99, Muir, Fayette Co., Ky.
Clift B. Keyes, '99, Schenectady, N. Y.
Walter D. Crebs, '99, Dayton, O.
W. W. Buntin, Jr., '99, Indianapolis.
John F. Schwed, '99, Chicago.
Nathaniel P. Burt, '99, Terre Haute.
James S. Royse, '94, Terre Haute.
F. F. Hildreth, '94, Terre Haute.
E. S. Johonnott, '93, Chicago.
Warren Hussey, '92, Terre Haute.
W. H. Harris, '91, Terre Haute.
Abe Balsley, '91, Terre Haute.
R. L. McCormick, '91, Terre Haute.
A. J. Hammond, '89, Terre Haute.
V. K. Hendricks, '89, Terre Haute.
George M. Davis, '88, Terre Haute.
Charles E. Scott, ' 86, Terre Haute.
H. G. Brownell, '86, Louisville, Ky.
Herbert W. Foltz, '86, Indianapolis.
Benjamin McKeen, '85, Terre Haute.
Samuel S. Early, '85, Terre Haute.

Faculty-Senior Base Ball Game.

FACULTY, 13; SENIORS, 12.

NOT many days before Commencement an artistic and anciently worded placard was discovered on the bulletin board challenging "Ye Faculty" to a game of base ball, and signed "Ye Seniors." After some hesitancy the Faculty accepted, naming several conditions under which the game must be played. No Seniors who had played on the ball team were to be allowed on the diamond, the umpire must be a Junior and be chosen by the Faculty, in all cases where there was the slightest chance of doubt the Faculty were to be given the benefit of the decision. Numerous other conditions were imposed, and it was evident that the Faculty intended to win the game and uphold the dignity of their respective positions.

At three o'clock the Faculty were on the field armed with such means of defense as they could procure. Shortly afterward the "grand entree" of the self-pronounced "Invincibles" occurred, and 'twas an event never to be forgotten in the history of the Institute.

Arrayed in gorgeous and becoming garments of many colors and styles, the Senior "Invincibles" paraded the campus to the music of their band, which played all the popular airs with a precision which the born artist only can command. Each breeze which floated across the campus bore with it the enchanting strains of music which the band thoughtlessly inflicted upon the unsuspecting audience.

The costumes were beyond description, and the amount of originality displayed and the evident attempt to surpass anything in the line of costumes heretofore presented, reflects great credit on the school in its cultivation of the individuality of the students.

Kidder as a walking advertisement of the Kidder Flour Mills should receive the thanks of the proprietors.

Burt certainly did his best to perpetuate the high collar fad and to bring highly colored vests back into fashion.

Edwards as the clown won the undivided admiration of the audience, and expressions of their appreciation of the fitness of the costume were heard on all sides.

Jumper was beyond description, and the remarks of the ladies, "how disgusting," express only too well his make-up.

McLellan may have attempted to represent an "Alabama Coon." but even the most depraved of

the southern coons would have hesitated to claim relationship.

Schwed was far too gaudy in his attire to have been "born and bred" in any other region than the fertile brain of a Senior who is about to graduate.

Davis was attired for summer, and evidently believed in the economy of the articles which many women pride themselves on.

Holliger evidently tried to bring back to the memory of all the good old days when Coates College was in its prime and the Polys were not allowed to enter the gymnasium.

Stone at once won the hearts of all the ladies with his courtly grace and innocent smile. His long golden locks, red shirt waist and childish face, made quite a charming picture of rural innocence.

Professor Hathaway deserves recognition for his brilliant plays at several times during the game. His slide at home was well worthy of the best efforts of the camera fiend.

Dr. Noyes more than covered himself with glory (dust) in his attempt to reach first.

Professor Place was out of practice and the few hits that he succeeded in making were due to the pitcher hitting the bat accidentally in place of putting the ball over the plate.

The two Mc's covered themselves with honor with their brilliant playing as the battery of the Faculty team.

Professors Kendrick and Wagner usually succeeded in finding the ball after the man was safely on base, but they cannot be blamed, as Charlie will let the grass grow long.

Mr. Shepherd was too near the grand stand to be able at all times to watch the ball, and every play he made was without doubt a grand stand play.

Nick did stop one ball, but oh my, the balls that went past, and how much trouble it was for him to watch the man coming and point out to the fielders where the ball was hidden in the grass.

The game was one of the most exciting and instructive that has been witnessed on the campus for some time. The audience was large and enthusiastic. The players and score were as follows:

FACULTY.	SENIORS.
McCormick, c.	Schwed, c.
McMeans, p.	Davis–McLellan, p.
Shepherd, 1 b.	Stone, 1 b.
Nichlas, 2 b.	Jumper, 2 b.
Hathaway, 3 b.	Kidder, 3 b.
Place, s. s.	McLellan–Davis, s. s.
Kendrick, r. f.	Edwards, r. f.
Wagner, c. f.	Burt, c. f.
Noyes, l. f.	Holliger, l. f.
Harris, Wires, Wickersham, Faurot, } Subs.	Kittredge—Sub.

Umpire—Meriwether.
Scorer—Likert.
Water boy—'Arry.

	1	2	3	4	5	6	
Seniors	2	3	0	4	2	1	—12
Faculty	3	5	0	3	0	2	—13

FIELD DAY.

After many changes of dates and numerous other conflictions and troubles, the state meet of the Indiana Inter-Collegiate Athletic Association was held Saturday, May 27th, at Indianapolis. The meet was a failure, considered from a financial stand-point, the audience being very small indeed. This was due to the fact that four of the schools were not represented and because there were other attractions in the city. Rose Polytechnic did not take part in the meet for reasons set forth in a previous issue of THE TECHNIC, while Notre Dame, Indiana University and Purdue willingly absented themselves from the meet.

The following are events and results of the contests:

Event No. 1—120-Yard Hurdles. Time, 18 2-5 seconds—Chapman of Earlham, first; Weil of State Normal, second.

Event No. 2—One-half Bicycle. Time, 1:17 4-5. McGregor, of Hanover, first; Hastings, of Earlham, second; Harold, of Earlham, third.

Event No. 3.—100-Yard Dash. Time, 10 4-5 seconds. Jones, of Earlham, first; Graves, of Earlham, second; Hunt, of State Normal, third.

Event No. 4—Mile Run. Time, 5.58 minutes. Adams,

of State Normal, first; Rodgers, of Earlham, second; Shoemaker, of Earlham, third.

Event No. 5—440 Yard Dash. Time, 53 seconds. Jones, of Earlham, first; Place, of Indianapolis, second; Hunt, of State Normal, third.

Event No. 6—Running Broad Jump, 21 feet 1½ inches, Peacock, Earlham, first; Pierce, Normal, second; Shanklin, Hanover, third.

Event No. 7—Mile Bicycle. Time, 3:22 1-5 seconds. Hastings, Earlham, first; McGregor, Hanover, second; Harold, Earlham, third.

Event No. 8—Sixteen-pound Hammer. Distance, 105½ feet. Peacock, Earlham, first; McGrew, State Normal, second; Morris, State Normal, third.

Event No. 9—100-Yard Dash. Time for final heat. This was not run off.

Event No. 10—Pole Vault. Distance, 9 feet 7 inches. Stabler, Earham, first; Thornerson, Normal, second; Graham, Indianapolis, third.

Event No. 11—Standing Broad Jump. Distance, 10 feet 2½ inches. Pierce, State Normal, first; Graves, Earlham, second; McClure, Wabash, Third.

Event No. 12—220-Yard Dash. Time, 24 seconds. Jones, Earlham, first; Graves, Earlham, second; Hunt, State Normal, third.

Event No. 13—220-Yard Hurdles. Time, 28 3-5 seconds. Hill, Earlham, first; Chapman, of Earlham, second; Weil, State Normal, third.

Event No. 14—One-half Mile Run. Time, 2:12 3-5. Adams, State Normal, first; Schaff, Franklin, second; Mehring, Indianapolis, third.

Event No. 15—Running High Jump. Distance, 5 feet 7 inches. Peacock, Earlham, first; McClure, Wabash, second; Weil, State Normal, third.

Event No. 16—Putting Shot. Distance, 34.5 feet. Place, Indianapolis, first; Peacock, Earlham, second; Pallem, State Normal, third.

Event No. 17—Five-Mile Bicycle. Time, 16:50. McGregor, Hanover, first; Harold, Earlham, second; Hastings, Earlham, third.

Earlham easily captured first place, with 78 points to her credit; Indiana State Normal took second, with 34 points; Hanover third, with 14 points; University of Indiana fourth, with 10 points, and Wabash fifth, with 4 points.

It is to be regretted that the other schools did not participate, for, as it is, the meet was only nominally one of the I. I. A. A.

Notre Dame, Indiana University and Purdue held a triangular meet at Lafayette on the same date. Notre Dame took first place, with 78 points; Purdue second, with 34 points, and Indiana University third, with 23 points. It is reported that the above-mentioned colleges have organized a league of their own, though we fail to see how any beneficial results can be obtained from such an organization.

PIPE RUSH RULES.

In the excitement of a pipe rush, even the coolest headed man is liable to over-exert himself and to overtax the strength of some weaker man unintentionally. Where the rush is drawn out indefinitely and is only ended by one of the classes acknowledging their defeat, when all of the members are so exhausted that no one is able to enter the crowd and scrap for a pipe, the strain upon the constitution of many becomes excessive and permanent injury may result. There has never been a serious injury at Rose Tech, but in the last few years the rushes have been of such a nature that there was no deciding who were the real victors. Last year the rush was stopped by President Mees, as he considered it had gone on long enough, and it was becoming more or less a personal struggle between a few of the strongest of the classes.

In order to obviate any such steps having to be taken in the future the Council drew up the following rules and presented them as a resolution to the Student Body in General Assembly. They were adopted without opposition and therefore have become a law, which will govern the rush of next fall and all succeeding ones:

1. That hereafter the annual pipe rush shall be on the first Saturday after school opens and shall begin whenever the Freshmen produce their pipes.

2. After a time not to exceed fifteen minutes has passed the referee shall blow a whistle and shall then throw a large dummy pipe into the crowd, composed of both classes.

3. Fifteen minutes afterward the referee shall again blow a whistle and shall ascertain the man having the pipe. The class to whom the man belongs having the pipe shall be declared victors.

4. In case more than one man has hold of the pipe, the class having the greatest number of hands upon the pipe will be declared victors.

5. The referee shall be a Senior, chosen by the Council.

Commencement.*

THE fifteenth commencement of the Rose Polytechnic Institute was held on June 15, at 10 o'clock, in the main room of the gymnasium, which had been tastefully decorated with palms, laurel, etc. A large audience of the friends of the graduating class and of the Institute, and a number of the Alumni, had gathered together to witness the final exercises of the year and the granting of degrees to the members of the Class of '99.

Upon the platform sat our honored President of the Board of Managers, Hon. Richard W. Thompson, Mr. W. C. Ball, Vice-President of the Board of Managers; President C. L. Mees, Professor Mortimer E. Cooley, Professor of Mechanical Engineering, University of Michigan; Rev. William Torrence, D. D., Pastor of Central Presbyterian Church; Mr. Edwin S. Johonnott, Ph. D., class of '93, Assistant in Department of Physics, University of Chicago.

The members of the graduating class occupied chairs upon the left hand of the rostrum, and the Faculty were seated upon the right. The orchestra were placed in the balcony overlooking the rostrum and furnished a delightful program of music at intervals during the exercises.

*THE TECHNIC desires to thank the *Gazette* for the privilege of publishing this report which appeared in that paper on Thursday, June 15th.

Programme:

MUSIC.

PRAYER.

MUSIC.

ALUMNI ADDRESS.
MR. EDWIN S. JOHONNOTT, '93.

MUSIC.

ADDRESS.
PROF. MORTIMER E. COOLEY.
The Engineer in the Navy.

Presentation of Diplomas.

Awarding of Prizes.

Benediction.

MUSIC.

After a few introductory remarks by President Mees, Rev. Dr. Torrence led in prayer. President Mees then introduced Mr. Edwin S. Johonnott, who delivered the address in behalf of the Alumni Association. President Mees then introduced, in an eloquent manner, the speaker of the

day, Professor Mortimer E. Cooley, Professor of Mechanical Engineering of the University of Michigan. Professor Cooley is a graduate of Annapolis, and had served in the United States Navy before retiring to private life. Upon the outbreak of the late war he at once entered the service in the engineering corps and served with honor during the whole war. Coming afresh from the scenes of battle and service in the Navy as an engineer, his address upon "The Engineers in the Navy" was listened to with the closest attention, as he spoke from personal experience and close observation. His address was both eloquent and delightful, and THE TECHNIC regrets that he did not use manuscript but delivered his address extemporaneously, so that it has been only possible to give a brief outline of the trend of thought.

President Mees then introduced Hon. Richard W. Thompson, President of the Board of Managers. A profound silence fell over the audience as the "Grand Old Man," in his ninety-first year, walked forward on the rostrum, supported on either side by President Mees and Professor Cooley. For a moment there was absolute stillness and every ear was strained to catch the eloquent words which would fall from his lips. His voice arose clear and strong, and as he in his elegant and chaste language gave the departing class a last few words of advice before they entered upon their life work, every student, alumni and friend, followed with earnest attention the matchless flow of words, and the sound advice that came from one who has spent his life in the noblest service of his country and friends. Only a few words did he speak, but everyone who was present will bear away with them the recollection of these few words as one of the greatest pleasures of the commencement.

Mr. W. C. Ball, Vice President of the Board Managers, was then introduced and addressed the graduating class as follows :

As a representative of the Board of Managers the pleasant privilege has been accorded me of saying some final words to you, the members of the graduating Class of 1899, in connection with the presentation to you of your diplomas. Not what I may say to you, or of the course, but what you have achieved who have run it, is the significant event of today. By your own election your lips are sealed, and you take no audible part in these exercises. But you speak through your mere presence here with the arduous eloquence of things done, in a language not to be misunderstood and that needs no interpreter.

The course at the Rose is not an easy one. This is not mentioned as news. You are probably familiar with the fact. It has been so from the first, for at the beginning the standard was placed high. All changes made since, or that will be made hereafter, have been and will be in the line of raising the standard higher and making the course harder. Not how many can be graduated, but how well those who are taken in hand can be trained has been and will be kept steadily in view as the abiding purpose. Rose men have been known for the thoroughness of their mental and manual equipment. That is the secret of the demand for them that has so often enabled them to step directly from the Institute to industrial establishments needing trained men, and has so frequently robbed commencement day of the personal presence of some of the graduates. The Institute expects you to do your full share towards maintaining that reputation. Others coming after you demand and have a right to demand this of you.

During your connection with the Institute a notable advance has been made in the methods of management. Larger liberty of action in attendance on recitations and a greater participation in the management of the Institute itself, in so far as it relates to personal conduct and control of the various organizations and activities of institute life have been accorded to the student body than in any other institution of learning with which I am acquainted, or than would have been practicable or possible a few years ago. The result has been gratifying in every way. It has resulted in better work and better order and demonstrated that self-government is not only the

best but is the only real government. A part of the credit for the inception and success of these changes of methods belongs to you, and here and now, voicing in this the sentiments of the Board of Managers and faculty, I thank you for it.

Under the choir of St. Paul's Cathedral, London, one of the stateliest churches of the world, lies the body of Sir Christopher Wren, its architect. A tablet bears the inscription: "Si monumentum requiris circumspice"—"If you would seek his monument look around you." "Not storied urn nor animated bust," but stately the cathedral—that was and is and always will be the monument of the man whose cunning brain conceived it. He could ask for no better.

Similarly with some differences, and yet, on the whole, in a larger way, the Rose Polytechnic Institute is one of the several monuments erected by the man of large heart and kindly hand whose name it bears. Who would seek his monument should look for, and would find it, not only here but wherever a Rose Alumnus is or has been or shall be and is doing or has done or shall do his appointed life work well. For good or evil he will be a share-holder in all your achievements. You could not have it otherwise if you would. You would not, I hope, if you could.

The diplomas you receive to-day show that you have completed the prescribed course of study. But they are more than that. They are your titles to nobility, enrolling you, if you choose to have it so, in the ranks of the "Aristocracy of Usefulness"—the only order of nobility really worth a man's while to belong to. It is an order without any insignia or trappings. Just do your duty to yourselves and your fellow-men—the plain duty that lies in front of you—do it to-day, not tomorrow, for tomorrow never comes, using all the faculties with which your Creator endowed you and this Institute trained—that is to be a knight in this order. And that is what the Rose Polytechnic expects of you.

With each passing year the Rose Polytechnic Institute as a body, corporate and spiritual, is becoming greater. Every alumnus is part and parcel of it, and the list is lengthening. Individually and collectively all are concerned and have a stake in you. On what its alumni do the reputation of the Rose rests.

One of the gratifying features of the school, already alluded to, is the fact that men in charge of large interests having need of trained brains have looked to the Rose for such men. They have learned to look to the Rose because the training here has been thorough, fitting its alumni for such duties, and because its alumni have acquitted themselves creditably. Do you not see that some boys, now in knickerbockers, such little chaps that it would be shabby in you not to look out for them, and other boys, a countless throng, yet unborn, have an interest in what you shall do, and are personally concerned in your acquitting yourselves like men! You are the beneficiaries of the work of the alumni of previous years. It will be discreditable in you not to transmit your inheritance unimpaired. May we not hope that you will improve the estate?

Alma Mater—Cherishing Mother—is what the Rose Polytechnic has been to you for four years and always will be. The past participle of the verb "to cherish," is cherished. The cherishing mother should also be the cherished mother. All she asks at your hands is what good mothers ask their boys—always boys to them—to be. Not more truly and sincerely will the mothers and fathers of your blood rejoice in your successes than will your Alma Mater. You may feel absolutely sure of this. Here will abide faith in, hope for and charity towards you. Your failures will be her failures; your successes will be her triumphs. Whatever the outcome, her future and yours are indissolubly bound together by bands stronger than steel. These bands will hold as long as your lives shall last for the Rose will outlive us all and bloom through the ages.

After awhile, and all too soon, however long delayed, the time will come when a heap of grass-covered earth, out under the sheltering shade of the trees or the blue vault, will mark the last resting place of earthly parents. But your Alma Mater will live in perennial youth. As such

abiding and cherishing mother she has a right to ask and does ask that, whatever betides, you be good men.

Gather gear? Certainly, as much as you fairly can and by every wile that's justified by honor. A good, solid resting place for the fulcrum is necessary to the successful working of any lever that is to move or lift things. Some money of your own, made by yourself, or personal service given by yourself, is that solid resting place. Sometimes it is also fulcrum and lever. The philanthropy that expends its energies in devising plans or the expenditure of other people's money, having none of its own, does not accomplish much and is, on the whole, rather wearying.

Maybe, I cannot tell, the advice is unnecessary. At any rate, and at a venture, let me suggest that you do not hold yourselves too cheaply. Rate your professional services at their worth. But play the game of life fairly. Remember it is race, not a fight. Outrun your competitors if you can, but do not trip them up, nor pull them down, nor foul them in any way. (Perhaps I ought to say that in my youth the modern game of foot-ball had not been invented. It was played then with the feet. The kicking was limited to the ball.) And don't forget to throw your hat in the air for the winner. Your turn will come next.

Two things are almost as good as winning. One is deserving to win. The other is the resolute refusal to permit any failure to become a stumbling block and the conversion of it to a stepping stone to higher things. Eternal striving and doing your best—those are the anchors that hold.

One thing more. Your education will naturally bring you into business relations with government in one or more of its enfolding forms as town, township, county, state or nation. Be gentle there. Government, our kind of government, of and by and for the people, the only kind of government to live under or worth dying for, is a very precious and, in a way, fragile thing. Hopes and fears and tears and toil and blood and treasure, much suffering and sacrifice not a little, are all woven into these governmental garments with which we have clothed ourselves. It cost so much. So much depends upon it. If it goes wrong so much may be lost. If it fails the consequences to us, to humanity and to the unborn millions of the years to come may be so disastrous that good citizenship is of superlative importance. Let me adjure you to be good citizens.

And when some of you come, as doubtless some of you will, to render professional service to the government in any of its many forms, do your very best. Put government, all government, in the book and volume of your living with your mother, and scorn to do the one wrong as you would scorn to wrong the other.

Let me be more specific. If, happily, any of you should be selected to build a system of water works for a town, or to construct any public utility for the public—for government—do the very best you can for the least you can. Do it faithfully, putting into it all the brains you inherited from your mother and father, all the training you received here at the Rose, all the experience acquired in the world. And do it honestly. That is patriotism, modest but sturdy and enduring. It may not be recognized by flags or drums or by special monuments. It does not need them. The work will be its own monument as this school is a monument and you and all the alumni of it, and all that shall become alumni in future years, are and will be living monuments to the memory of him who founded it. Do something worthy in this line. Bring the record of it back with you when you come here in five or ten or twenty years from now, or whenever you will. Your Alma Mater could receive from your hands no gift she would cherish more. It is now my pleasant privilege to present to you your diplomas.

Mr. Ball then presented the diplomas to the members of the class, conferring upon them the degree of Bachelor of Science.

BACHELORS OF SCIENCE—CLASS OF '99.

IN ELECTRICAL ENGINEERING.

NATHANIEL P. BURT . . . . . Leavenworth, Kan.
WILLIAM G. DAVIS . . . . . Washington, D. C.
EDMUND P. EDWARDS . . . . . Louisville, Ky.
FREDERICK H. FROEHLICH . . . . . Toledo, Ohio.
JESSE E. HOLLIGER . . . . . Terre Haute.
CECIL A. HOWELL . . . . . Mt. Sterling, Ky.
FRANK J. JUMPER . . . . . Terre Haute.
CLIFT B. KEYES . . . . . Crown Point, N. Y.
GEORGE H. LIKERT . . . . . Terre Haute
JAMES J. McLELLAN . . . . . Louisville, Ky.
J. MILTON PLATTS . . . . . Terre Haute
HARRY C. SCHWABLE . . . . . Greenville, Ohio.
ARTHUR C. THOMPSON . . . . . Terre Haute
CHARLES F. TRUMBO . . . . . Mt. Sterling, Ky

IN MECHANICAL ENGINEERING

NOBLE C. BUTLER, JR . . . . . Indianapolis.
WALTER D. CREBS . . . . . Dayton, Ohio.
CUBITT B. SMYTH . . . . . Winnepeg, Can.

IN CIVIL ENGINEERING.

ARTHUR D. KIDDER . . . . . Terre Haute.
JOHN F. SCHWED . . . . . Cleveland, Ohio.
ARTHUR P. STONE . . . . . Terre Haute.

IN CHEMISTRY.

HARVEY G. KITTREDGE . . . . . Dayton, Ohio.

TITLES OF THESES.

FOR DEGREE OF ELECTRICAL ENGINEER.

Magnetic Properties of Iron and Steel.
[Published Work.]
W. ARNOLD LAYMAN, M. S.

Electrolysis Due to Street Railway Currents.
FRANCIS H. MILLER, M. S.

The Correction of Faults in the Operation of a Large Unit Electric Power Generator.
W. OFFUTT MUNDY, M. S.

FOR DEGREE OF MECHANICAL ENGINEER.

The Design of a Complete Cement Mill.
WILLIAM S. SPEED, M. S.

FOR DEGREE OF MASTER OF SCIENCE.

The Chemical and Physical Structure of Iron and Steel.
JOHN J. KESSLER, JR., B. S.

Modern Switch Board Design.
GEORGE W. WELLS, B. S.

Cast Iron Chilled Car Wheels.
UHEL U. CARR, B. S.

FOR DEGREE OF BACHELOR OF SCIENCE.

Construction and Test of a Four Kilowatt Three Phase Alternator.
WM. G. DAVIS, ARTHUR C. THOMPSON, CECIL A. HOWELL

Design for an Isolated Electric Lighting and Power Plant for the Hotel Turpen, Greenville, Ohio.
HARRY C. SCHWABLE.

Test of a Five Horse Power Wagner Electric Manufacturing Co.'s Single Phase Alternating Current Motor.
EDMUND P. EDWARDS, CHARLES F. TRUMBO.

Electric Lighting and Power Plant for the Rose Polytechnic Institute.
NATHANIEL P. BURT.

The Windmill for Electric Power.
J. MILTON PLATTS.

A Test of the Storage Battery Plant of the Ohio Valley Telephone Company, with Statistical Results.
JAMES J. MCLELLAN.

A Study of the Dielectric Breaking Down Strength of Oils.
CLIFT B. KEYES.

A Test of the Vigo Ice and Cold Storage Company's Plant.
GEORGE H. LIKERT, FREDERICK H. FROEHLICH, FRANK J. JUMPER.

Test of a Locomotive Boiler.
NOBLE C. BUTLER, JR, WALTER D. CREBS.

Test of Terre Haute House Power Plant.
CUBITT B. SMYTH.

The Determination of the Heating Value of Various Vegetable Growths for the Purpose of Determining their Availability for Use as Fuel.
JESSE E. HOLLIGER.

A Study of Deflections under Various Loadings and Train Speeds of a Pratt Truss Bridge at Reelsville, Ind
ARTHUR D. KIDDER, ARTHUR P. STONE, JOHN F. SCHWED.

The Formation of a Tetra-Methylene Derivative by the Distillation of the Calcium Salt of Homophthalic Acid.
HARVEY G. KITTREDGE.

According to the custom adopted two years ago, the theses of the graduates were not read during the exercises. They were, however, read on Tuesday and Wednesday before the examining committee, consisting of the faculty, General Foreman Wm. Wright, of the Vandalia shops; A. M. Underhill, Engineer of Maintenance of Way of the Peoria Division of the Vandalia, and F. F. Hildreth, '94, Assistant Engineer of Motive Power Terre Haute & Indianapolis R. R. Co.

President Mees then awarded the following prizes:

The Heminway Gold Medal, awarded for the highest standing during the four years' course—Mr. James J. McLellan, of Louisville, Ky.

The Heminway Bronze Medal, for the highest standing in the Freshman Class—Mr. Claude E. Cox, of Libertyville, Ind.

Honorable Mention, awarded to the following:

Senior Class—James J. McLellan, Louisville; Arthur D. Kidder, Terre Haute; Frank J. Jumper, Terre Haute.

Junior Class—J. I. Brewer, Terre Haute; Robert York, Pine Bluff, Ark.; Henry Lesser, Indianapolis; S. J. Kidder, Terre Haute.

Sophomore Class—Robert N. Miller, Louisville; Harry A. Schwartz, Louisville.

Freshman Class—Claude E. Cox, Libertyville; Arthur J. Paige, Terre Haute; Samuel D. Burge, Toulon, Ill.; Donald E. Rust, Kansas City, Mo.

Mr. M. B. Stewart, '98, was awarded a certificate for having completed the Post Graduate Course in Civil Engineering.

COUNCIL MEETING.

The Council held its last meeting for the year on June 7th, 1899. Reports of the various committees were received. The report of the Committee on rules governing the pipe rush was adopted. The treasurer's report was accepted, and is as follows:

REPORT OF TREASURER OF THE STUDENT COUNCIL OF ROSE POLYTECHNIC INSTITUTE.

Total amount received from the Student Body of Rose Polytechnic Institute for Spring Term of 1899, $261.00, divided among the Associations as follows:

Athletic Association, 50 per cent.	$130 50
The "Rose Technic," 15 per cent.	39 15
The Rose Scientific Society, 5 per cent.	13 05
The "General Fund," 30 per cent.	78 30
	$261 00

INDIVIDUAL ACCOUNTS.

ATHLETIC ASSOCIATION.	*Dr.*	*Cr.*
Student Fund		$130 50
Bal. due Swope & Co. on medals	$ 9 00	
Base ball expenses	31 40	
Shingling grand stand	16 00	
Salt for tennis courts	3 00	
Sundry expenses	68 10	
Amount to balance	3 00	
	$130 50	$130 50
Amount on hand this date		$ 3 00

THE ROSE TECHNIC.	*Dr.*	*Cr.*
Student Fund		$ 39 15
General expenses	$ 39 15	
General Fund		52 70
Scientific Society		13 05
Bal. on printing acct.	65 75	
	$104 90	$104 90

ROSE SCIENTIFIC SOCIETY.	*Dr.*	*Cr.*
Student Fund		$ 13 05
The "Rose Technic"	$ 13 05	
	$ 13 05	$ 13 05

GENERAL FUND.	*Dr.*	*Cr.*
Student Fund		$ 78 30
Stenography	$ 2 00	
Stationery for the "Council"	85	
Stationery for the "Council"	10 75	
Special appropriation	12 00	
"Rose Technic"	52 70	
	$ 78 30	$ 78 30

Respectfully submitted,
HARRY S. RICHARDSON,
Treasurer.

June 7, 1899.

A general assembly was held at 5 p. m. and the report of the Council presented. The pipe rush rules were unanimously adopted (see Athletics), the treasurer's report was also approved. By the vote of the assembly it was decided to give all of the surplus in the General Fund to THE ROSE TECHNIC after all the other Associations had received their full quota and all the expenses of the Council had been paid.

By unanimous vote, Article I Section 1 of the Constitution was amended to read:

All legislative power granted, together with such executive and judicial powers as herein provided for, shall be vested in a Council known as The Students' Council of the Rose Polytechnic Institute.

Dr. Mees presented the subject of the Honor System in examination in a very forcible manner and called the attention of the student to the necessity of their regulating this side of college life. A discussion followed but no definite action was taken and the matter was referred to the Council next fall, to be taken up and some plan provided by which the order and conduct of the students in examination and class rooms could be regulated entirely by their fellow class-mates, thus relieving the faculty of the unpleasant and entirely unnecessary duties of superintending the examinations.

THE SCIENTIFIC SOCIETY.

The members of the Junior and Sophomore classes met in the Museum on June 7th, and held the annual election of officers for the Scientific Society for the ensuing year:

J. I. Brewer, '00, President.
H. E. Perkins, '01, Treasurer and Secretary.
W. H. Insley, '00, Senior Councilman.
R. N. Miller, '01, Junior Councilman.

The Scientific Society has been an absolute failure for the last year. Only a few meetings were held during the first term, and in spite of the fact that a number of papers were prepared and the officers notified that the men were ready to read these papers, no meetings were held. This is indeed a deplorable state of affairs, and the officers are to be blamed in a large measure for the failure of the society. While three or four were prepared to deliver their papers, when the last meeting was held the officers were aware

of the fact that no other papers, or at least only one or two, would be promised for the future. For this reason the meetings were discontinued because of absolute indifference on behalf of the larger part of the students.

The new officers have decided to change the hour of the meeting back to the original time, on Friday night, and hope by this and energetic work on their part to arouse interest enough to restore the society to its former position of prominence in the organizations of the Institute. If each student will take it upon himself to do a little extra work this summer in preparing a paper, or even in closely examining some engineering feat of interest, so as to be able to give the results of his observations next fall, and will return to the school with the determination of doing his share in making the Scientific Society a success, there will be no need of the officers doing more than providing the place and time. The support and encouragement of the different organizations rests upon the individuals, and on their enthusiasm and energy depends the success or failure of each enterprise.

THE CIVIL CAMP.

The Civils of '01 and 02, together with some of the older students, are at present in camp at Forest Park under the instruction of Mr. McCormick, running a line from the Big Four R. R. to the line that was run last year. Those in camp are: J. T. Dickerson, M. F. Huthsteiner, R. K. Rochester, Walter Gibbons, H. E. Perkins, Robt. York, Jessie Loofbourow, M. B. Stewart, T. B. Talmadge, Bert Dewees, John Gray, C. E. Smith, C. G. Taylor, S. A. Brentano, E. L. Jones, F. A. Kattman, H. S. Williams.

The line of this survey is about one and one-half miles in length, and is to be entirely completed—transition curves run in and slope stakes driven. The former surveys covered more ground, but the work has not been finished—the two weeks in camp not giving sufficient time for its completion.

The Civils have been hampered to some extent by the mosquitoes, "chiggers" and a colored camp-meeting, but excellent work is being done.

Notice.

We, ye members of ye Senior Class, do most respectfully challenge ye most honored Faculty to a game of Base-ball, on ye Campus of ye Institute, Saturday, 6-10-99.

Teddie Roosevelt Thompson, Capt.

P. S.—No smoking allowed. R. S. V. P.

The challenge of the Senior Class to a game of base ball is accepted subject to the following conditions:

1. Both umpires shall be selected by the faculty team.

2. In case of any uncertainty in any play, the faculty team shall be given the benefit of the doubt.

3. Members of the Institute base-ball team shall be debarred from playing.

4. The faculty team shall be allowed as many coachers as they may see fit to use.

5. No limit to the size, style, or kind of stuffing shall be placed upon gloves used.

Signed: FACULTY BASE BALL TEAM.

The proverbial justness of the faculty manifests itself in the easy conditions imposed.

We recognize their urgent necessity for a large number of coaches and gladly consent to a suspension of the rule regulating that matter.

Their consideration for the spectators, as shown by their stipulation for padding, is beyond all praise.

Regarding questionable decisions, it was a foregone conclusion as to whom they would be awarded.

If they are placing dependance upon "rooters" to help them out of the rut, may we suggest that a stump puller would probably be more effective.

To insure gentle treatment it will only be necessary to "cross your fingers."

In accepting their conditions we only stipulate that ***under all circumstances they conduct themselves as gentlemen!***

SENIORS, '99.

SENIOR RECEPTION.

The faculty entertained delightfully Wednesday evening, in honor of the graduating class, with a reception in the Gymnasium.

The floor had been cleared and tastefully decorated, the palms and laurels which were scattered around the room made the Gymnasium a most attractive place for a reception and dance. In the balcony overlooking the main floor the orchestra was placed, while punch and ices were served in the Directors' room. At ten the floor was cleared and dancing was indulged in until the close of the evening. The reception committee consisted of President Mees,

Dr. and Mrs. Gray, Professor and Mrs. Wickersham, Professor and Mrs. Hathaway, Professor and Mrs. McCormick, Professor and Mrs. McMeans, Professor and Mrs. Wagner, Professor and Mrs. Howe, Dr. Noyes, Professors Peddle, Faurot, Kendrick, Place, Shepherd, Mrs. Burton, Mrs. C. C. Oakey, Mrs. James Hunter and Miss Ethel Benjamin.

A large number of the Alumni and friends of the graduating class were present. The number of alumni who were present added much to the enjoyment of the evening, for their return to their Alma Mater is the renewing of friendships which have been broken only by time and distance. The night was delightful and the last dance and stroll on the campus came only too soon for those who had so thoroughly enjoyed the evening.

THE CENTURY NUMBER OF THE MODULUS.

"The Junior Class of the Rose Polytechnic Institute announces that on May 1, 1900, the fourth *Modulus* will appear. The excellence of the previous books, as well as the fitness of the Class of 1901 to publish an annual, gives confidence to the announcement that the book will be original, well gotten up and worthy of its Alma Mater.

"The *Modulus*, 1901," will be a special edition commemorating the year of its publication, 1900.

"The *Modulus* board will do its utmost not only to render the book an artistic success, but also to make it of more general and permanent interest than the average college annual.

"The book will be bound in an appropriate and specially designed cloth cover. Its size will be 8 x 11 inches. Hardly a page will be without an illustration, and special care will be taken with the drawings and decorations. Many photographs of organizations and objects of interest will be included, and every feature of life at old Rose will be represented in the volume.

"The price of the book has not been definitely fixed. It will not exceed $1.50. The Board hopes to sell the book for less than the above sum, but has deemed it best not to fix the price absolutely until resources are more accurately known.

"Communications may be addressed to the editor or business manager, at the Institute. Editor-in-chief, R. N. Miller, Louisville, Ky. Chairman of committees — Business, L. L. Helmer, Terre Haute; Illustration, H. A. Schwartz, Louisville, Ky.; Literary, T. Dickerson, Terre Haute; Publication, R. K. Rochester, Dayton, O."

WHERE THE FACULTY WILL SUMMER.

Mr. Place will spend the summer at Ithica, N. Y.

Mr. Shepherd will remain in the city most of the summer.

Mr. Harris will spend the summer in the Adirondack mountains.

Professor Wickersham will spend most of the summer in Terre Haute.

Professor Kendrick will spend the summer at his home, Newton, Mass.

Professor Wagner and family will spend the summer at Ann Arbor, Mich.

Professor Malverd A. Howe and family will be at the seashore in Massachusetts.

Mrs. S. P. Burton will spend the summer at Worcester, Mass., with Professor and Mrs. Ames.

President Mees will spend the greater part of the summer in the city engaged in looking after the affairs of the Institute.

Professor Hathaway will deliver a series of lectures on Quaternions at the Summer Quarter of the University of Chicago.

Professor Faurot will spend the first of the summer teaching in the Normal Summer School. Later in the summer he expects to go east.

President Mees, Drs. Gray and Noyes, will attend the meeting of the American Association for the Advancement of Science, to be held in Columbus, Ohio, in August. They will read papers before the Association.

Dr. Noyes and family will spend the summer at Dennis, Mass. Dr. Noyes will attend the meeting of the American Society for the Advancement of Science, to be held in Columbus, Ohio, the latter part of the summer.

Y. M. C. A.

The Rose Tech Y. M. C. A. have just published and issued one of the most attractive hand books that have come under our notice. Bound in red leather, of vest pocket size, it contains the addresses of the Faculty, map of Terre Haute, diary for every day of the year, schedules for the terms, church directory, calendar, college insignia, together with the constitution of the Council and full descriptions of all the organizations of the Institute. The officers of the Association are to be heartily congratulated upon the success of the venture and deserve the hearty cooperation of the students in every endeavor which they are making for the mental, physical aud spiritual good of all.

Special notice should be called to their headquarters in Room 42, third floor, at the head of the west stairway. This room will be open at all hours to the students and they are most heartily invited to partake of all of the privileges and comforts which are provided. Easy chairs will be found there, chairs for study and writing, writing paper, the new magazines, and games that will help pass a few hours more pleasantly than loafing around the halls.

The Bureau of Information which is maintained at the Institute during the first few days of the school year, is of great assistance to new students. All of the trains are met by members of the Association and the new men are looked after and any service that can be rendered them is most willingly granted.

"THE LOCOMOTIVE TEST."

To an undergraduate the expression, "these's time," conveys the idea of five weeks of sanctioned indulgence and an unrestrained partaking of some of the pleasures of life with just enough experimenting on some particular "cinch" to bring the beneficiary on the campus now and then. To one who has gone through that time, however, it has a different meaning. Usually, if anything of any consequence is attempted, the alumnus looks back to the weeks spent in the manufacture of apparatus and getting ready. One week of tests and breakdowns and finally one of dismantling and calculating results which prove highly unsatisfactory, and about all the benefits he derives is that if he were required to make a similar test at some later date, he could perhaps do it to some degree of satisfaction. Butler and Crebs, in their persistent efforts to secure some data concerning locomotive boilers, used up six weeks and had made only two light tests. They then took two days off, one to report these two tests to the examining board, thereby securing a diploma, and one to receive the diploma in the presence of their friends. They immediately resumed operations and at the time we go to press they have completed their tests and are now standardizing instruments and calculating their results, which will probably keep them busy for another week. They feel satisfied, however, and besides having learned a great deal about the strength of materials and the "inherent cussedness" of machines, they report that they have obtained some very good data regarding the air supply for locomotive gates, heat losses through stack, power required to move a slide valve, contents of smoke gases, and temperatures in fire boxes and smoke arch. They wish through these columns to express their thanks to Messrs. Harvey Kittredge, Harry Richardson, Chenoweth Housam, Donald Rust, Robert Rochester, Robert Warren, and Leslie Helmer for the assistance which they very kindly offered and without which they could not have progressed.

RESOLUTIONS.

TERRE HAUTE, IND., May 31, 1899.

WHEREAS, It has been the will of the Divine Providence to remove from our midst our fellow classmate, Elmer Brown, therefore be it

Resolved, That we, the Class of '94, R. P. I., most sincerely regret the loss of one, whose association with us during the completion of our course, endeared him to all in bonds of deepest friendship and fellowship. Further be it

Resolved, that these resolutions be published in THE ROSE TECHNIC.

COMMITTEE.

"Things with long names are, as a rule, no good."—J. F. W. Harris.

Mr. McCormick, at the ball game, with one of his off day glares: "Who called me a turkey?"

Judge Butler and Miss Butler of Indianapolis attended commencement to see Butler, '99, graduate.

Professor Hathaway has been instructing some of the tennis enthusiasts in a few of the expert strokes.

A new rake most fearfully and wonderfully made of wood is the latest contribution to the campus.

Neat booklets advertising the 1901 Modulus, which will appear May 1, 1900, were distributed at commencement.

A well gotten up poster of the Modulus, 1901, was put up in the Gymnasium for the Reception and Commencement.

Any time that the Civils don't get ahead of the Instructor, in camp, it will be because the Instructor suffers from insomnia.

Clay wants to know how his kind but light-fingered friends knew the key which he had "lost" was in McMeans' pocket.

Quite a large force of Sophomores and Juniors assisted in the thesis test of the ice plant made by Likert, Jumper and Froehlich.

We hope by this time most of the students will be at home and enjoying the fatted calf to which they have so long looked forward.

A very successful 6½ x 8½ picture of the ball team was taken recently for the Modulus. Copies can be had through R. N. Miller, care 2101 Eighteenth street, Louisville.

Many of the Faculty have expressed their thankfulness that the afternoon of the ball game was too cloudy for the amateur photographers.

Insley, '00, and Larson, '00, will represent the Rose Tech Y. M. C. A. at the summer conference of the Y. M. C. A. at Lake Geneva, Wis.

Prof. O. E. McMeans read a very interesting paper on the construction of fire-proof buildings before the Terre Haute Science Club on May 8th.

The Vandalia engine tested by Butler and Crebs was an object of great interest as it stood puffing away at full speed, yet standing perfectly still.

'Arry has for once been betrayed into an untruth. He said that it never rained Commencement week. But of course that's the fault of the weather.

There have been a larger number of applications for admission to the Freshman Class than in a number of years. The forthcoming class is very promising.

The Freshman and Sophomore Civils, with several men of the upper classes, left the morning of the 16th for the camp at Forest Park, where they will be until June 30.

Jumper was elected tracer of the Class of '99. The plan of continuous class letters which they have adopted, is as follows: One man writes a letter and sends to the next, the next encloses with it a letter of his own writing and sends the

packet on its way, the bundle thus going the rounds of the class, and each man, when it reaches him, substituting a new letter for his old one.

The next time Perkins and John Gray go out snipe hunting John will not be so anxious to hold the bag, for after all Perkins' talk about how much he liked to see the snipe run into the bag, he ran off and left John alone in a dark ravine with the bag and the candle and only one match, with not a house in miles.

The next time the rain is falling in torrents and the wind blowing a gale, Mr. Harris will think twice before he tries to scare a little dog with his umbrella, or perhaps it will not be so convenient to borrow a new one—or to find a stone to throw at the dog, because the wind turned his umbrella inside out and tore the cover off.

The result of Kittredge's thesis as to the formation of a tetramethlene ring by the distillation of the calcium salt of homopthallic acid, seems to prove that the ring does not exist. The interest in the thesis lies not so much in the conduct of this particular salt as it does in the information which its behavior would give as to the probable conduct of other substances of similar formation.

SUMMER ADDRESSES OF SENIORS.

C. P. Trumbo, Muir, Fayette County, Ky.

A. C. Thompson is located at Ridgeway, Pa.

P. H. Froehlich, 917 Bohen Street, Toledo, Ohio.

H. G. Kittredge, 42 Linden Avenue, Dayton, Ohio.

J. J. McLellen, 2315 West Broadway, Louisville, Ky.

E. P. Edwards, 1036 Fourth Avenue, Louisville, Ky.

C. A. Howell has accepted a position in the laboratories of the General Electric Company, Schenectady, N. Y.

W. G. Davis, 2211 R Street, N. W., Washingington, D. C.

C. B. Keyes will be with the General Electric Company, Schenectady, N. Y.

N. P. Burt will be in Leavenworth, Kan., during the first part of the summer.

A. D. Kidder has gone to Webb City, Mo., where he will be engaged in zinc mining.

W. D. Crebs expects to attend the Business College in Dayton during the early part of the summer.

N. C. Butler, Jr., has accepted a position with the Henry R. Worthington Hydraulic Works, Brooklyn, N. Y.

F. J. Jumper has been given the position of Assistant Superintendent of the Terre Haute Car Shops, Terre Haute.

J. E. Holliger, 1927 North Seventh street, Terre Haute. Will be with the Kester Electric Company for a short time.

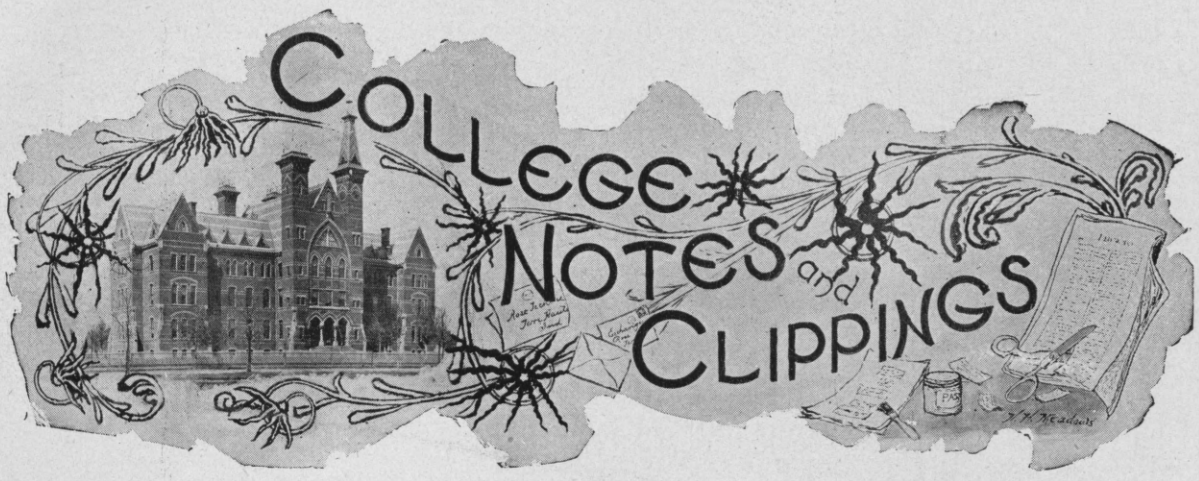
A. P. Stone has gone to Wheeling, W. Va., to accept a position as draughtsman with the Wheeling Corrugated Iron Works.

George H. Likert has accepted a position with the Union Pacific Railroad, and will be in the railroad shops at North Platte, Neb.

J. F. Schwed has accepted a position with the Chicago & Northwestern Railroad, Chicago. At present he is engaged in construction work.

H. C. Schwable will install an isolated lighting plant in the Hotel Turpen, Greenville, Ohio, during the early part of the summer. Later he expects to be in New York City.

C. B. Smyth left some weeks before commencement to accept a position in Denver. He writes that he is draughting for the Colorado Iron Works, manufacturers of mining machinery, Denver, Colo.



Smoke prevention has been accomplished in several Milwaukee establishments by the use of steam jets, either alone or assisted by cross walls in the furnaces. In the Kern Mills the pipes feeding the jets are opened and closed automatically by the act of moving the furnace doors. The orifices of the jets have a diameter of one-sixteenth of an inch, and since they have been in service it has been found practicable to burn material which was formerly useless under the boilers. In the McGeoch Building the steam pipe is led over the fire for some distance to an orifice, which gives the jet a fan shape. This arrangement is believed to be of advantage, because of the superheating of the steam before its discharge. The fuel used in this building is a mixture of two parts of soft coal screenings and one part hard coal dust.—*Engineering Record.*

A long cantilever span is contemplated across Sydney harbor, in Australia, and, according to the London *Engineer*, it is very likely to be erected. The structure will consist of two pairs of balanced cantilever arms and a suspended center span of 400 feet, making altogether a structure which, with approaches, will be a little more than 5,000 feet in length. There will be a 60-foot roadway at about mid-height of the trusses to accommodate street cars, carriages and pedestrians. A clear height of 180 feet is afforded for navigation under the middle 400 feet of the 1400 foot channel span. The main towers are apparently about 350 feet high and 150 feet long and the main trusses have curved top and bottom chords and a double triangular system of web members, making single intersections. The designs were made by Mr. William Kenwood, of Sydney, and the New South Wales Parliament has passed a bill authorizing the construction of the bridge.

The most recent "new source of energy" introduced to the world of Magazine Science is the "Multiple Energizer Power Economizer." This also comes from Philadelphia and $90,000 is supposed to have been spent in construction, tests, etc., thus far. It consists essentially of four very heavy fly wheels on one shaft and clutched to or released from it at will. By another system of clutches a five-horse-power engine is attached to each wheel until it is brought up to a speed of about 190 revolutions per minute, when it is disconnected and the wheel is clutched to the shaft and allowed to do work in coming to rest. When the speed of the first wheel has slackened perceptibly it is unclutched from the shaft and a second one applied. "All the little engines have to do is to bring the large fly-wheels up to speed." The work of the machine is obtained from the rims of the fly-wheels. Any mechanical engineer of fair ability with the aid of some steam engine indicators and a prony brake could create consternation among stockholders, if there be any, but since no one seems to have "bit" a mechanical discussion of the machine is out of order at present.